MECCANO MAGAZINE
for Boys

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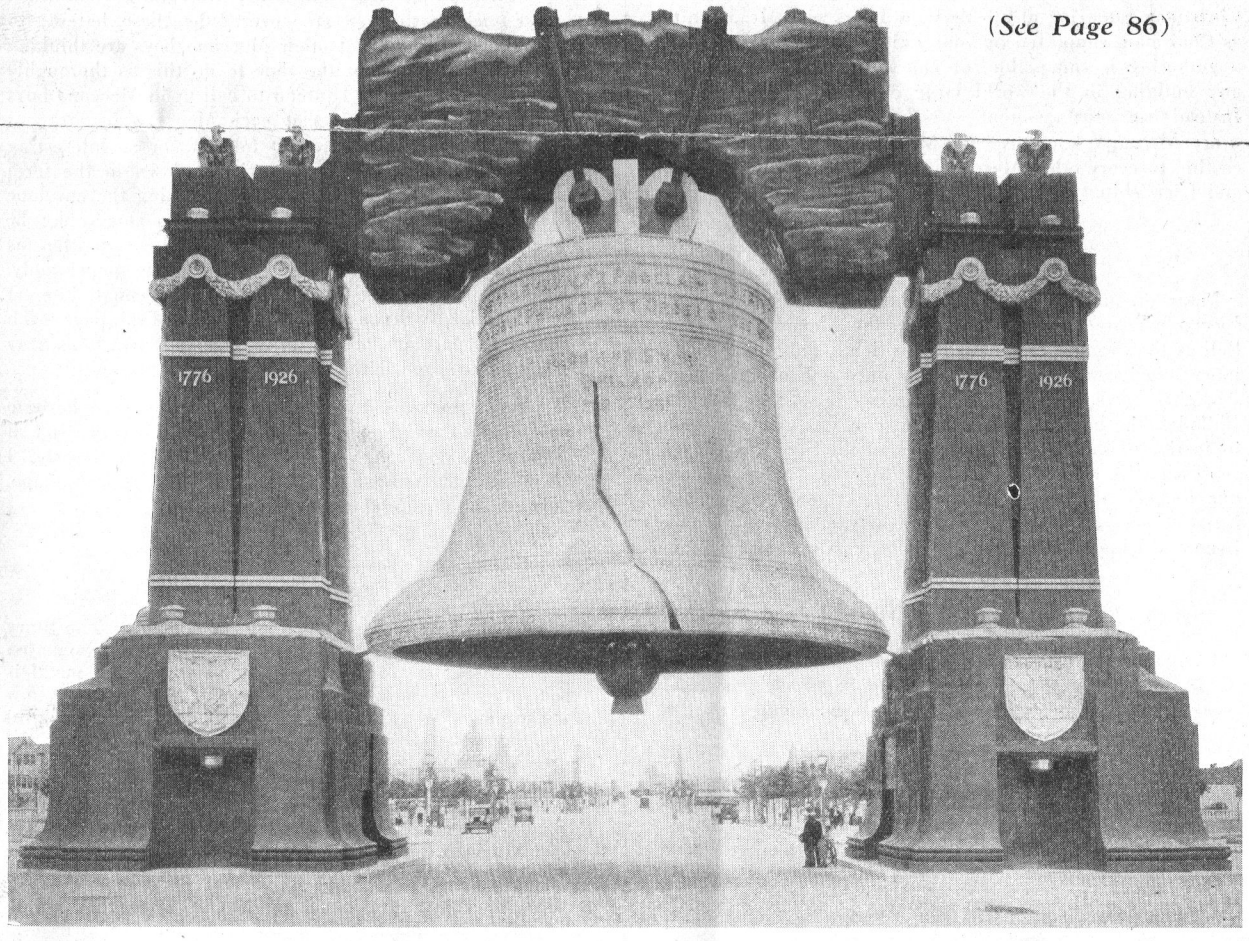
"At the Sesqui-Centennial"

By a Meccano Boy

(See Page 86)



The Mammoth Replica of the Liberty Bell at the Entrance

The Editor's Own Page

Good Wishes

A very merry Christmas to all readers of the "M.M."! I feel that this must be my first thought and my first words in this special Christmas number. I hope every reader will have a real happy time, with plenty of fun and frolic. I shall think of you all on Christmas morning, and shall imagine the good times you are having in all parts of the country—indeed, in all parts of the world, for Christmas is one of the few festivals in which the world partakes as a whole.

Christmas is not only a season of good times, but it makes tens of thousands of new friends for Meccano boys. Each boy who receives a Meccano Outfit as a Christmas present, joins our great brotherhood of boys; each becomes a member of our world-wide movement. What vast pleasure is in store for these new Meccano boys! What jolly times ahead! And on Christmas Day we shall all think of these things, and wish we might have a great Christmas gathering of all Meccano boys, with Mr. Hornby as Chairman, supported by your Editor and his staff. Such a gathering is impossible, of course. We could not find any building in the world large enough to hold us all! Instead we must content ourselves with knowing that every Meccano boy this Christmas is, in thought, broadcasting to every other Meccano boy a message of good-will and friendship.

Our Cover

Many of our readers will no doubt have seen the great spectacle reproduced on our cover—the Mammoth Liberty Bell at the Sesqui-Centennial Exposition. This great monument, if it may be so called, is only one of the many inspiring scenes which the visitor to the Exposition in Philadelphia beheld. In order to give our readers some indication of the splendor and scope of the Sesqui a special representative was sent by the Editor to "cover" it for our readers and to tell us about the things that would interest most of the readers. The article appears in this issue and I know that all of you will find it very interesting.

Increased Size

I am quite sure that all my readers will approve of the "M.M." in the new and bigger form in which this issue comes to them, and which has now been adopted as the standard for the future.

The size in which it has appeared heretofore imposed severe limitations and prevented the publication of large pictures to illustrate a number of articles in course of preparation. In addition, the increased space will now permit me to add several new features which I have had in mind for some time, but which I was prevented from publishing heretofore on account of lack of space. I shall be glad to have you write me and tell me how the new size appeals to you.

New Experiences

The large number of letters I receive every day covering almost every topic under the sun, fully bear out my contention that Meccano boys are more observant and more keenly interested in the daily happenings in the world around them than are other boys. Most of the letters I receive contain at least one point of general interest. One may be a new idea for making something—not necessarily a Meccano model—and another of doing something in a new manner. Or there may be an account of some unusual occurrence or incident, such as what it feels like to be in a sand-storm, or to win a cup in an athletic meet, each of which experiences formed the subject of recent letters from two of my correspondents.

Ideas Wanted

One of the main objects I always have in view in editing the "M.M." is that of keeping every Meccano boy informed of just such matters as are covered by these letters; to tell them, in short, "what other Meccano boys are thinking and doing." I have not the time to do this as thoroughly as I wish, and therefore I intend to call upon Meccano boys to help me. My plan is that each Meccano boy who at any time has a new idea to put forward, or an interesting experience to describe, should write it down in the form of a short article, and send it to me, marking the envelope "Ideas" in the lower left corner. Articles should not be longer than 500 words, and they should be written as neatly as possible and on one side of the paper only. Those articles that are likely to prove of general interest to my readers will be published in a special page each month and paid for at our usual rate. Illustrations may be sent, if desired, either drawings or photographs.

I want to make it quite clear that no boy need hesitate to send in an article because he may not be very good at composition. So long as he states the facts clearly, I will, if necessary, have his article put into proper shape, ready for publication.

And now, just a word about our next issue. The Story of Brass will continue with a description of the production of brass rods, one of the two forms in which this metal is used in the manufacture of Meccano parts. The plans for the next "World's Largest Suspension Bridge," the proposed span across the Hudson that will dwarf even the new Delaware River bridge, will be told, and there will be an illustration of an architect's drawing, showing how the great structure will look. A new model-building contest will be announced, new models illustrated, more puzzles, etc. All in all, the February number will be one that no reader should miss.

The Meccano Magazine is published every second month and the subscription rate is 25 cents for one year (six issues). If you do not already subscribe to it, send in your remittance now.

The Story of Brass

Part I

The History of Brass-making

THE opening of King Tut-ankh-amen's tomb brought to light a fine collection of copper and brass articles and confirmed the belief that the manufacture of brass was well-known among the ancients. The brass of those days was made up of a mixture of copper and tin, and crucibles for the melting of the copper and evidence of copper mines date back over 4,000 years B. C.

The copper forming the base of the brass used by the ancients was originally mined in Cyprus, while the tin came from Spain and Great Britain. Later the copper was alloyed with zinc ore and shortly after the birth of Christ copper and zinc was combined together in the mixture which we now know as brass. This formula and process existed with hardly a change down to the 18th century. The crucibles, the tongs, the methods of combining the metal in the pots, the stirring, skimming and pouring of brass were performed hundreds of years ago almost exactly as they are today.

In a business founded on so many ages of tradition it was perhaps natural that the work of the brass caster became a mysterious one, founded not on scientific knowledge but on practices handed down from generation to generation. The mixing of their alloys and the mysterious black magic which was exhibited by the casters would excite laughter today, but in those days it was all very serious.

The Magic Pellet

The crucible of molten brass would be bubbling in the coal fire, all was set to "pull the pot" and pour the metal, when in would swagger the master caster. He would take out of his pocket a small paper envelope and out of this remove a mysterious pellet which he would hide in his hand and secretly drop into the crucible. What this pill contained no one knew but it changed the brass from one alloy to another. What it probably contained was a little tin for strength, or a little lead for free turning qualities.

The first brass making in America dates from 1644, when John Winthrop successfully carried on some casting of brass at Lynn, Mass., and both there and in Boston brass cannon were cast before the Revolution. In 1750 John Allen established a brass factory at Waterbury, Conn., and made brass buttons, knee and shoe buckles. At that time these articles were more expensive than they are today, for buckles cost about $10.00 a pair and buttons about $2.00 each.

In 1801 Colonel Paul Revere, the hero of "Paul Revere's Ride," converted an old powder mill at Canton, Mass., into a plant for the manufacture of copper sheets and bars, operating under the name of Revere's Copper Company. A year later there came to Waterbury from England two brothers, Abel and Levi Porter, who started manufacturing buttons from brass sheets. The Porters were the first to make brass by direct fusion of copper and zinc. Their raw materials came from England and when the brass ingots were made they were taken to a mill at Litchfield, Conn., for rough-rolling and later they were brought to Waterbury for a finished rolling.

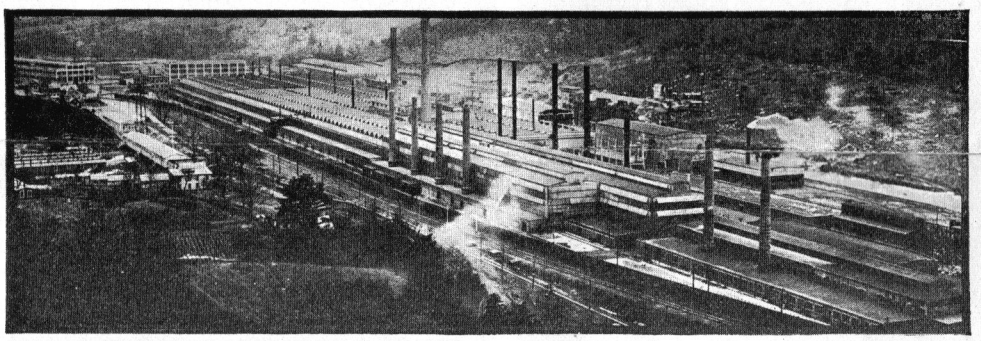


Photo Chase Co's. Inc.

One of the great Brass Mills in the Naugatuck Valley of Connecticut.

The Nation's Brass Center

America's brass industry came from the activities of these pioneers and the banks of the Naugatuck River at Waterbury became the center of brass manufacturing in this country. Neither raw materials nor mills were close at hand but water power and fuel supply were plentiful, and once started the industry continued to grow in this vicinity until now 65% of the world's brass supply is produced in the State of Connecticut.

The brass mills of the Naugatuck Valley have been the largest and steadiest customers of the great copper mines of Michigan, Montana and Arizona. From a copper consumption of 12,000 pounds in 1820 the years of industrial expansion following the Civil War found the brass mills consuming 12,000,000 pounds of copper annually and the consumption is now at the rate of 6,000,000,000 pounds of copper annually. This means that (*Continued on page* 90)

The World behind your Telephone

The Automatic System

FROM the time of the earliest switch-boards the telephone engineers endeavored to perform automatically as many operations as possible. Their aim was to perfect a system that would dispense with the central operator, all the connections being made by mechanical or electrical means. Many forms of automatic systems have been developed and tried out from time to time but none of these would fulfill satisfactorily the complicated requirements of large cities.

An idea of the magnitude of this problem may be gathered when we consider that in New York City alone, for example, there are at present about one million telephone stations which are served by about ninety exchanges. Each one of these million subscribers in this great net-work must be able to reach promptly every other subscriber in each one of the many exchanges, in addition to those connected to his own exchange. It can easily be realized that the problem of producing equipment that will mechanically make the desired connections is one that could be solved only after years of development work.

Fig 1 (*left*)
A Standard Telephone Instrument equipped with the Dial for automatic operation.

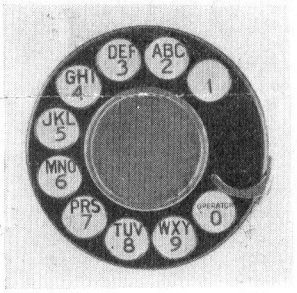


Fig. 2
An enlarged view of the Dial is shown above.

The Try-Out

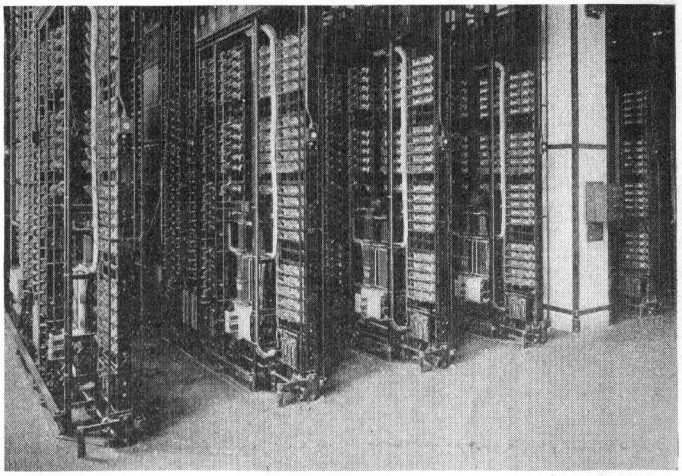
As a result of much investigation and long continued experiments the telephone engineers have produced an automatic switch-board which satisfactorily meets even the exacting service conditions referred to above. As a final step in the development of this system three complete central office equipments of the machine switching type were installed at Newark, N. J. In these installations telephone operators were employed to take the calls from the subscribers exactly as formerly, but instead of making the connections as described in previous articles in this series, the operators transmitted the calls to the automatic machinery by means of numerical keys. It was thus possible to try out a new form of apparatus without introducing any new method of calling on the part of the subscriber during the trial installation.

The results of these trial installations demonstrated that the new machine switching system would meet all the requirements of our larger cities. The work of manufacturing equipment of this character was then undertaken at once and the first installations were placed in service early in 1921.

How It Works

A detailed description of the machine-switching apparatus and the manner in which it works is beyond the scope of this article. However, a general idea of the fundamentals of the apparatus may be gathered by a brief description of the manner in which a call is handled.

The subscriber's station is equipped with the usual form of telephone instrument and, in addition with a calling device known as the "Dial," which is mounted at the base of the desk stand as shown in the illustration (fig. 1). This dial has ten finger-holes bearing the numerals one to nine; the tenth hole bears the numeral "0" and the word "operator." In the larger cities the dial also bears several letters of the alphabet in each finger-hole in addition to the numbers. A close-up view of this dial is shown in figure 2. In making a call the subscriber will first refer to the telephone directory but finds in the new directory that the exchange name is printed somewhat differently than formerly. The first two or three letters of the name are set in capitals, the remainder of the name being in small letters as usual.



A view of some of the complicated mechanism in a machine-switching central office

The automatic system is used in Elizabeth, N. J., and the telephone number of Meccano Company, Incorporated, is listed in the telephone directory as follows:

Meccano Company, Inc. .....EMerson 2272

Let us suppose that we have an automatic telephone instrument and wish to call up Meccano Company. We first remove the receiver from the hook and, placing it to the ear, listen for a steady humming (*Continued on page* 94)

How Jack discovered the Perfect Toy

HOW well I can remember the day I first met Jack. It was shortly after we moved to Maple Street and I had been so busy helping to get things in order that I had not had time even to meet the boys in the neighborhood. But at last mother did not have another thing for me to do around the house and I was free to go out and play. As I stepped on the veranda I noticed a boy across the street, aimlessly kicking his toes into the ground and looking so disgusted and angry that I was almost afraid to go over and speak to him. However, I did go, and I asked him what made him so "mad." "Oh, I've been working for a week building a big derrick with my construction toy," he replied, "and now I've got it all finished and the old thing won't work. I'm sick and tired of trying to build things with my set, and I feel like throwing the whole business away."

Well, that was pretty strong talk, I thought, and I asked him to show me his model. He took me into his room, and there on the floor was the derrick.

Jack's Model

Jack turned on the motor, but didn't let it run long, because the whole derrick shook so that it looked as if it would cave in. In fact, some of the parts actually bent almost in a semi-circle—they were made of such flimsy stuff. It didn't take me long to tell Jack that he might as well give up trying to build a real model with such poor material.

"I suppose you're right," he said, "construction toys are no good, anyway."

"Wait a minute," I cried, "hold your horses! Just come over to my house and see my construction toy and the crane I've just built—you'll soon change your opinion of them."

I Show Him My Crane

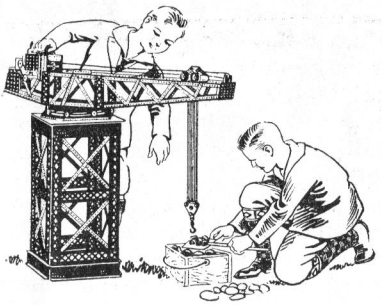
So over we went, and when we got to the door of my room Jack stopped short. An exclamation of amazement escaped from his lips and his eyes opened wide in wonder. There stood my crane, sturdy and rigid, many of its parts beautifully colored and gleaming in the sunshine. "Gee," exclaimed Jack, "it's in colors! What kind of a set made that? I never saw that kind before." "That's the New Multicolor Meccano," I told him, "absolutely the latest thing and the last word in construction toys."

Talk About Fun!

Jack made a dash for the crane. Together we worked the different controls and we spent the whole morning lifting and lowering loads and transferring all kinds of things from one place to another. Talk about fun! What amused me most, however, was the way Jack inspected the model, and how he marvelled at the strength of the various parts. He couldn't get over the fact that the model was so rigid, and he almost got heart-failure when I leaned on the top of the frame of the crane and showed him that it would bear my weight.

The electric motor came in for its share of inspection. Jack had never seen one like it before—in fact, there never has been another motor like the Meccano motor. And power? When I took an old hammer from my tool-box and attached it to the crane-hook, Jack wouldn't believe that the motor could lift it. Well, I showed him that the Meccano motor had "some pep," for it whisked the 2 lb. hammer up into the air so quickly that Jack almost went into hysterics.

"I'll bet she can't lift ten pounds," he said, and when I assured him it would, he thought I was only joking. So we searched around until we found an old box, and then loaded it up with everything heavy that we could get into it. Then I tied it to the crane hook, turned on the motor and threw the hoisting lever in. The motor gave a little buzz of surprise, and then settled down to its job. Up went the box, slowly yet steadily. No fear of that motor lying down on the job! Without trouble or fuss it hoisted the load, never hesitating or slowing down. Then I threw the hoisting gear out, put the rotating mechanism into engagement and the crane slowly turned on its swivel base. When it had turned a half circle I again stopped it and released the hoist-brake, dropping the loaded box to the floor.



"We searched around until we found an old box, and then loaded it up with everything heavy that we could find."

The Meccano Motor Surprises Him

All this time Jack looked on, speechless with wonder. When the box again touched the floor, the spell seemed to be broken, and with a sigh he exclaimed, "Gee, that's the best thing I ever saw. That motor has got more power than three like mine. But it's a special one, isn't it? That didn't come with the set?" I assured him that it was the standard Meccano Electric Motor and was included in my Meccano outfit.

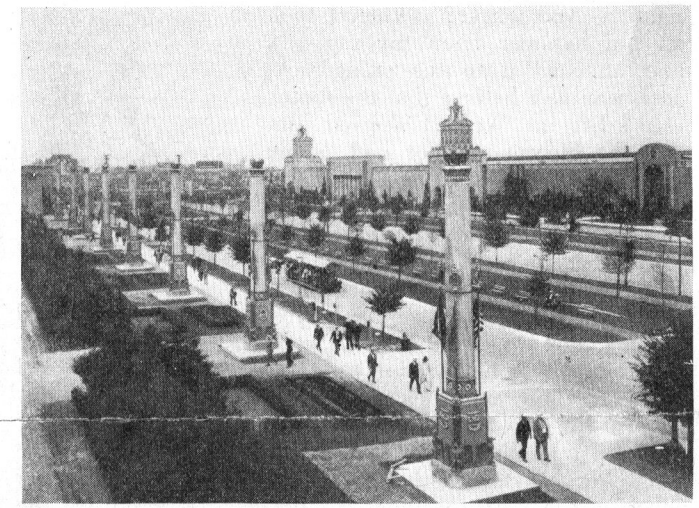
Jack now realized the great (*Continued on page* 93)

At the Sesqui-Centennial Exposition

The Story of a Meccano Boy's visit, as related to the Editor

By WILLIAM JOHN FRAZER

EVER since the Sesqui Centennial Exposition at Philadelphia opened in June I had wanted to visit it, for I had heard about the wonders of science and engineering that it contained. It seemed that this pleasure was to be denied me and I had almost given up hope of seeing the great exposition, when one day I received a letter from the



The Avenue of the Colonies

Editor of the "*M.M.*" Much to my surprise, I read that I had been selected to cover the Sesqui for our Magazine. At last my chance had come! I felt proud indeed that this honor should come to me, and it was with great enthusiasm and anticipation that I sallied forth one sunny afternoon.

As I approached the Sesqui grounds by way of Broad Street, a mammoth replica of the Liberty Bell in a square in front of the entrance could be seen for many blocks. Not until I was close to the enormous bell could I appreciate its tremendous size. It is illustrated on our cover, and some idea of its gigantic proportions may be obtained by noting the size of the people standing under it.

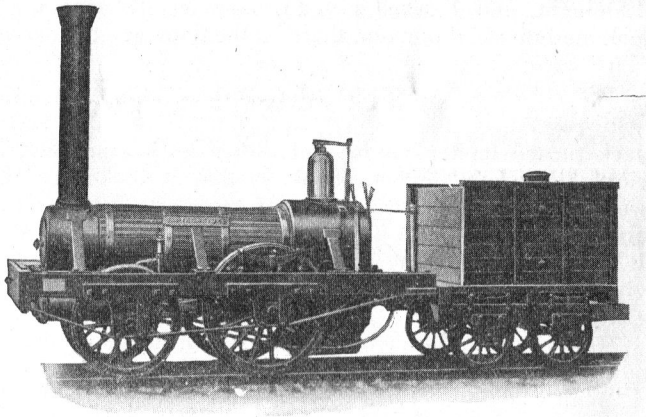
The Palace of Manufactures

The first thing that attracted my attention after I entered the exposition grounds was a long building at my left which I found to be the Palace of Liberal Arts and Manufactures, and which covers a floor space of 339,000 square feet—over 7½ acres! On entering the building a fairyland greeted my eyes. Manufactured goods of all kinds were on display and it was evident that I would have very little time to spend at each booth if I wished to see all the exhibits. It would take several complete issues of the "*M.M.*" to describe all the displays, so I am compelled to pass over the most of them without comment, confining my remarks to those that I think would interest the majority of our readers.

In a display by one of the railroads was a large model of the cities of Philadelphia and Camden, showing the new Delaware River Bridge, the railroad to Atlantic City and the ferry over the river. In the display miniature ferry boats and trains were being run by endless belts and the waves in the river were very cleverly reproduced by fluted strips of cardboard, painted with "water colors." This was one of the finest scenic models which I have ever seen in operation.

Making Bookcases

Small bookcases were being made in another booth. The part in the construction of these which interested me most was the operation of the band saw by which the wood was cut in beautiful curves. This endless band saw was running over a wheel about 16 inches in diameter, which made 400 R.P.M. The operator told me that, for really fine work,



"Old Ironsides"—a locomotive built in 1831

their factory machines ran about 1,600 R.P.M., which means that the saw band would travel about 75 miles an hour, or 100 feet a second.

The Electric Typewriter

An interesting exhibit of the latest development in writing machines—the electric typewriter—next attracted my attention. This remarkable instrument operates almost noiselessly and far more rapidly than the ordinary typewriter. One of the officials of the company, who happened to be there when I visited the booth, was very much interested when he heard that I represented the "*M.M.*" He told me that his boy was a Meccano fan and that he enjoyed Meccano immensely.

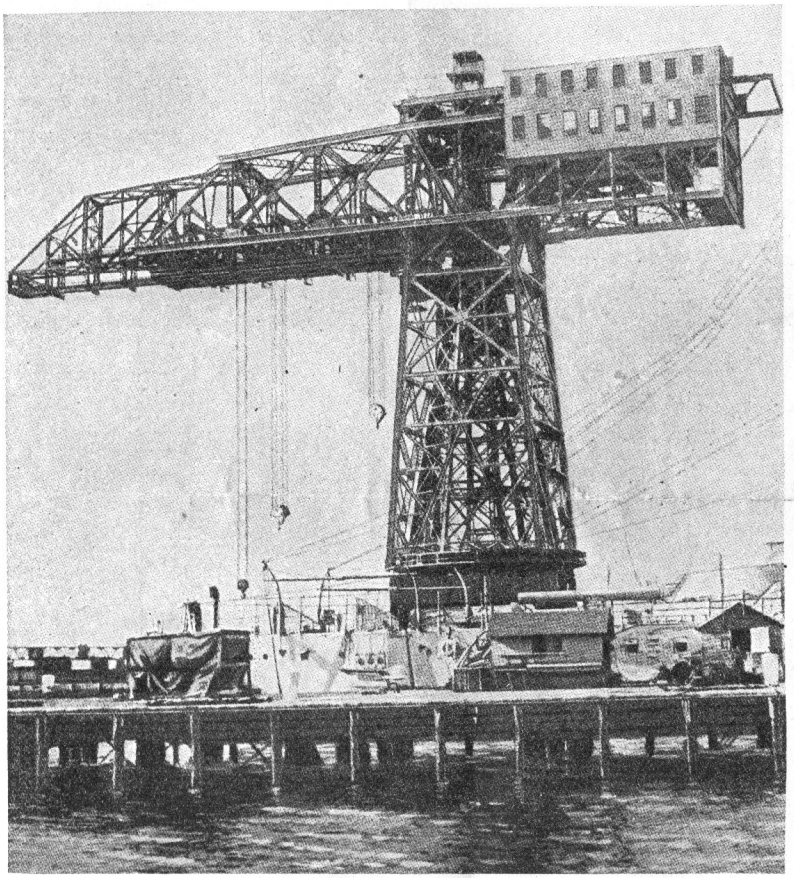
Home-Made Movies

An exhibit that would especially interest our photography fans featured a Motion Picture (*Continued on page* 90)

The Largest Crane in the World

ONE of the most fascinating engineering structures of modern times is the crane and there is hardly a boy—or man—who will not pause to watch a crane at work lifting weights that, without the aid of a hoisting means such as the crane affords, would be almost immovable.

The crane is not a modern invention, as some boys may have thought, for there are records over 5,000 years old in which cranes in one form or another are mentioned. The use of structural steel in the construction of modern cranes, combined with the application of steam and electricity as the power, enables modern engineers to build cranes of far greater size and lifting power than the ancients were able to build. Yet there are to be found a number of ruins of structures reared thousands of years ago, in the construction of which cranes and derricks of considerable size and power must have been used.



The Giant Hammerhead Crane at the Philadelphia Navy Yard.

Ancient Engineering

The great Pyramids in Egypt, erected some 6,000 years ago, contain many granite blocks weighing from 40 to 60 tons apiece. Modern engineers are at a loss to know how the ancients managed to transport and place in position such huge blocks without the help of powerful steam cranes and the latest mechanical lifting devices. Yet in the dim past these huge stones were cut in the quarry, dragged to the site and put up by men who knew nothing about the use of iron, or the wonderful power of steam, or about any of the modern methods employed for handling heavy loads.

Weight—Eight Million Pounds!

The illustration above is that of the world's mightiest crane. It is situated at the League Island Navy Yard at Philadelphia and is the property of the U. S. Navy. This crane is of the hammerhead type so familiar to Meccano boys, and weighs, with its load, a total of about eight million pounds, or 4,000 tons.

One of the difficulties facing the engineers in designing this crane was to obtain a firm foundation for this enormous weight. This difficulty was increased by the fact that the crane could not be located on dry land, for it was required to be in such a position that it could operate over two docks. It was therefore necessary to construct an elaborate foundation of piles upon which the foot of the crane could rest.

In the construction of this giant crane over 2,000 tons of steel and 1,000 tons of machinery were required. The height to the top of the observation tower is 250 feet, and an electric elevator is provided to reach the upper part of the structure.

The Three Hoists

The crane is fitted with three hoists, two of which have a capacity of 175 tons each. These may be worked singly or together, an equalizer beam being used when the two hoists are operated jointly. A forged steel hook in the center of this beam has a working capacity of 350 gross tons. The design of the crane permits this weight to be handled at any radius up to 115 feet, which is the maximum for the main hoist. The construction of the parts and erection of the crane required 20 months and a special derrick was built for use in assembling it.

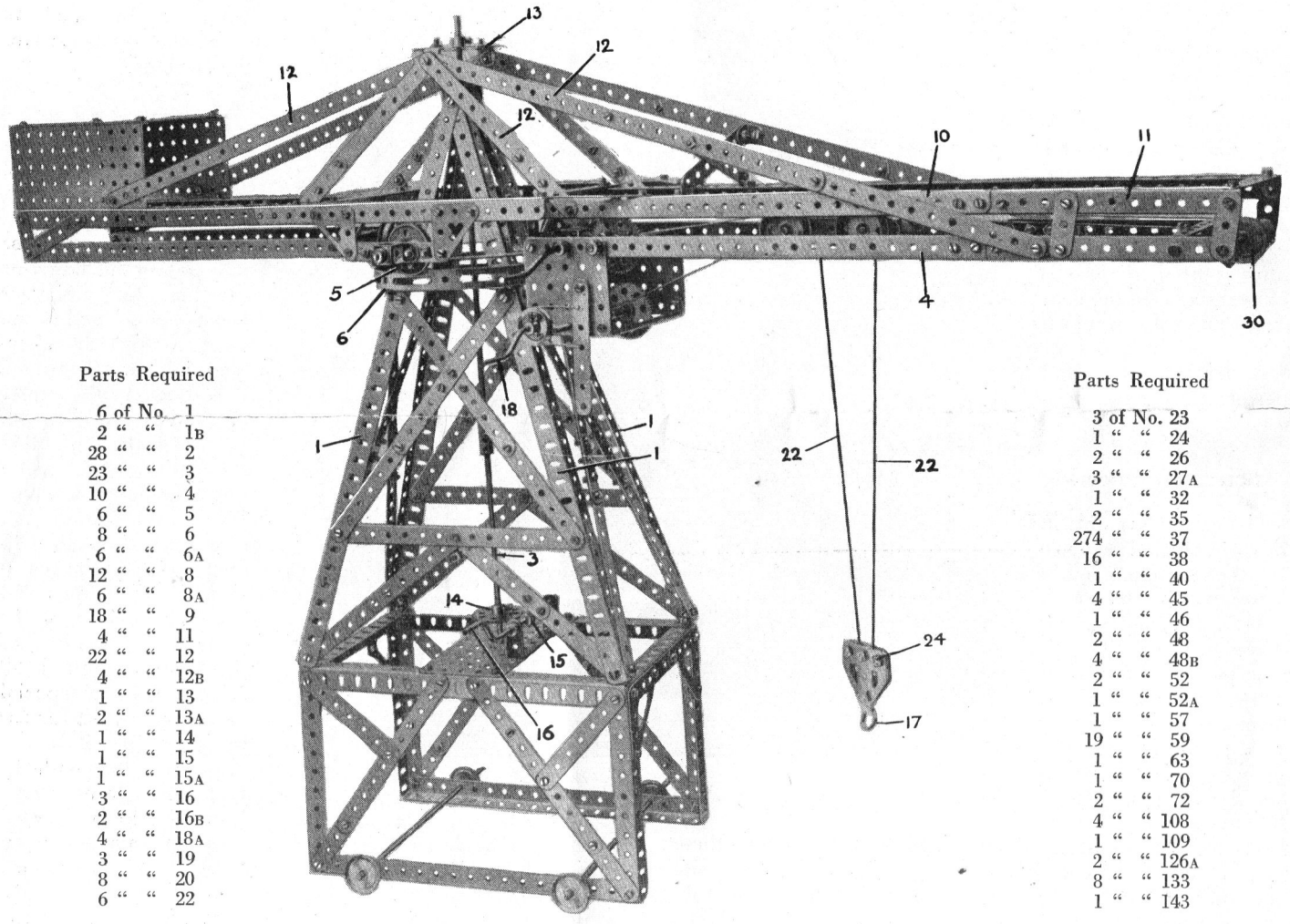
In order that both the rear and front cantilevers could be erected with the same derrick, the revolving mechanism of the crane was first installed. The cantilevers were then constructed and, in order to keep the load as nearly balanced as possible, the crane was revolved after a certain portion of the rear cantilever was installed to allow a section of the front cantilever to be constructed. This operation was reversed several times until the two cantilever arms were completed.

On Exhibition

The League Island Navy Yard was included in the grounds of the Sesqui Centennial Exposition at Philadelphia and the mammoth crane described here was viewed by thousands of persons during the past half year. Its colossal size and almost unbelievable power caused much interest among the visitors.

How to Build a Meccano M

BEGIN to build this model by constructing the main tower, the details of which are clearly brought out in the illustration below and also in Fig. A on the next page. Notice that the inclined corner angle girders 1 are connected at the top (as shown in Fig. A) by a bush wheel 2 secured by angle brackets. This bush wheel forms a bearing of the vertical rod 3 by which the cantilever arm 4 is turned.



Parts Required

6	of No.	1
2	" "	1B
28	" "	2
23	" "	3
10	" "	4
6	" "	5
8	" "	6
6	" "	6A
12	" "	8
6	" "	8A
18	" "	9
4	" "	11
22	" "	12
4	" "	12B
1	" "	13
2	" "	13A
1	" "	14
1	" "	15
1	" "	15A
3	" "	16
2	" "	16B
4	" "	18A
3	" "	19
8	" "	20
6	" "	22

Parts Required

3	of No.	23
1	" "	24
2	" "	26
3	" "	27A
1	" "	32
2	" "	35
274	" "	37
16	" "	38
1	" "	40
4	" "	45
1	" "	46
2	" "	48
4	" "	48B
2	" "	52
1	" "	52A
1	" "	57
19	" "	59
1	" "	63
1	" "	70
2	" "	72
4	" "	108
1	" "	109
2	" "	126A
8	" "	133
1	" "	143

The Cantilever Arm

The cantilever arm turns on a wheel-race formed of flanged wheels 5, which run on a circular girder 6 supported by four 1" x ½" angle brackets bolted to the corner girders 1. The cantilever is built up (as shown in Fig. B) from two 9½" angle girders 8 braced by two 5½" angle girders 9 overlapped nine holes. From these, 12½" angle girders 10 extend at one side, and to similar girders 10 at the other side are connected 5½" girders 11.

The inclined strips 12 are connected at the top, by means of angle brackets, to a face plate 13 secured to the vertical rod 3. At the foot of the rod 3 is a 1½" gear wheel 14 engaged by a worm wheel 15 operated by the crank handle 16 and in this way the cantilever arm is swung round, the wheels 5 riding on the circular girder 6.

Raising the Load

The load carried from the hook 17 is raised or lowered by the crank handle 18, a ½" pinion 19 on which engages a 1½" gear wheel 20 on a rod 21 on which is wound a cord 22. This cord passes over a ½" pulley 23 to the block 24 and back over another ½" pulley on the trolley, and is secured to the 3½" x ½" double angle strip 25 at the outer end of the cantilever arm. Consequently when the trolley is caused to travel along the cantilever arm the load

lodel Radial Travelling Crane

remains suspended at a constant height—an important point and an interesting detail.

How to Connect the Trolley

The trolley is caused to move to and fro along the cantilever arm by the action of the crank handle 26. On this a ½" pinion 27 engages a 1½" gear wheel 28 on a rod on which is wound the cord 29, the opposite ends of which are connected to the opposite ends of the trolley. The cord 29 passes round a pulley 30 at the outer end of the jib. By turning the crank handle 26, therefore, the cord 29, winds on and off its rod, and moves the trolley to and fro, its wheels 31, as shown in Fig. C, running on the angle girders 10.

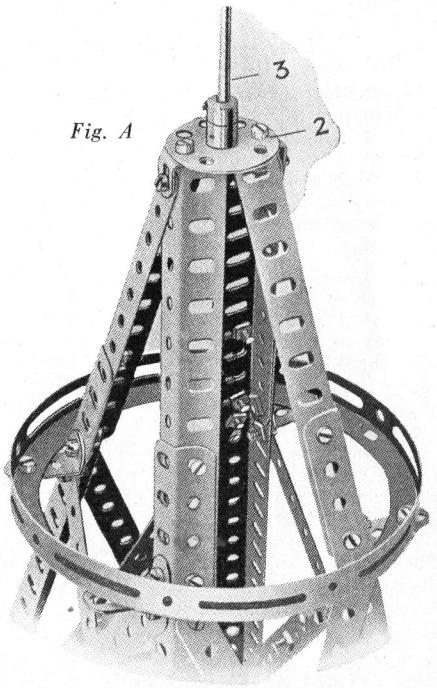


Fig. A

The Turn-Table Wheels

The wheels 5 are connected to 1½" rods 5a which are journalled in double bent strips 5b bolted to 3½" strips 5c carried from the angle girders 8 by corner brackets 5d.

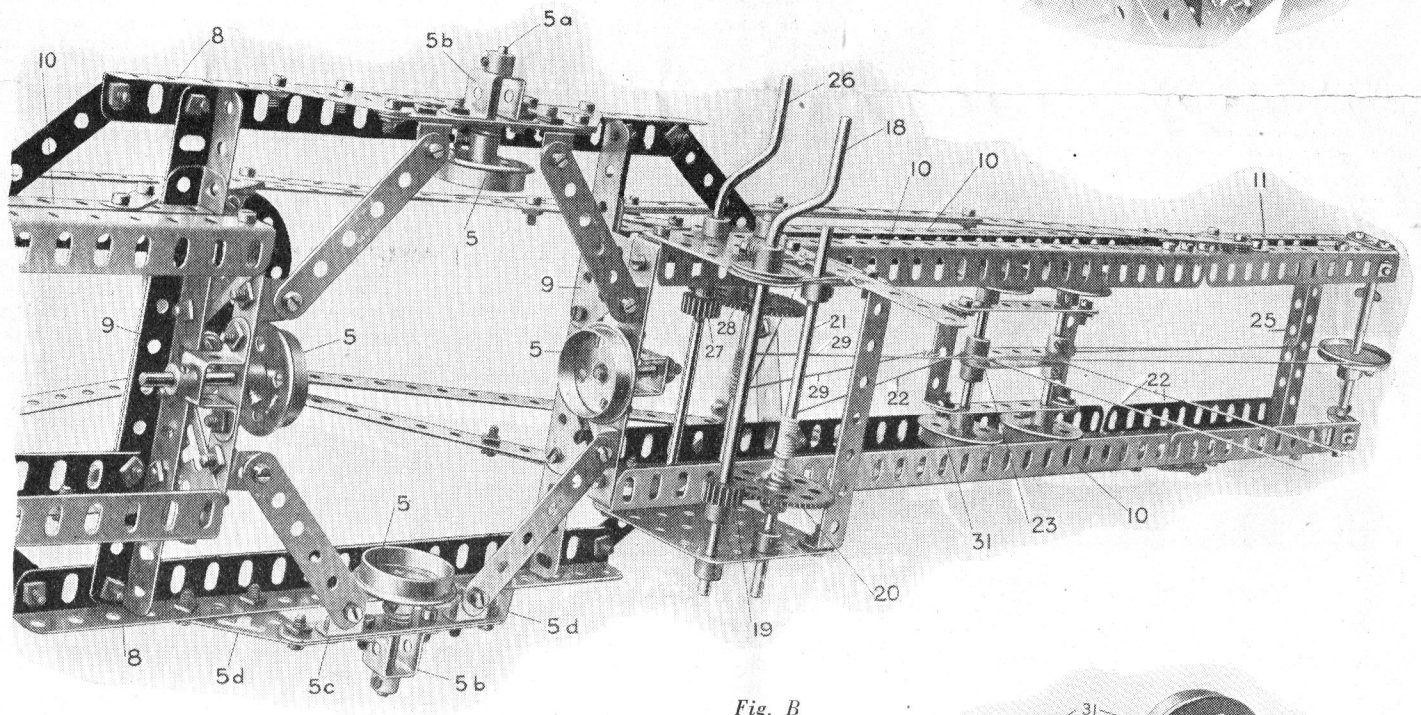


Fig. B

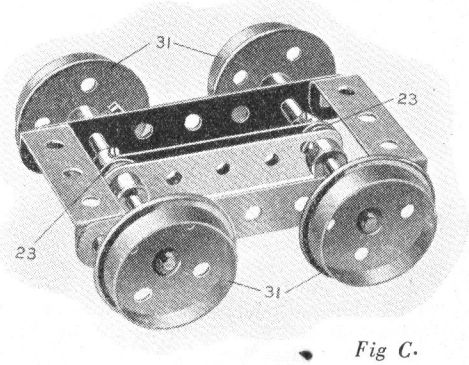


Fig C.

Radial cranes are used extensively in iron and steel yards and in lumber yards, where it is necessary to drop loads over a large area. The ground covered by the rotating cantilever arm is very considerable, and in some cases the arm is of great length. If it is desired to drop the load close in to the crane it is only necessary to run the travelling trolley (or truck) inwards along the arm. This enables the load to be dropped at any point between the base of the crane and the end of the arm.

The Story of Brass

(*Continued from page* 83)

approximately one-half of all the copper consumed in this country goes into use at the present time in the form of brass.

How it is made

As mentioned before, brass consists of a combination of copper and zinc. The two metals are melted together in a crucible. The top of this crucible (or furnace) is only a little above the floor level and it is customary to have the part of the shop near the furnace entirely reserved for making castings.

Copper melts at a temperature of 1996° fahrenheit while the melting point of zinc is as low as 773° fahrenheit. It is therefore necessary to melt the copper first and introduce the zinc only a short time before casting, by means of tongs pushing down small pieces under the melted copper. The zinc melts immediately and after the two metals have been thoroughly mixed the "charge" is then poured into moulds. The crucible method of preparing brass is rapidly giving way to the electric furnace, as it is a task beyond the possibility of crucible melting to produce brass with the necessary degree of accuracy that is required by modern industry.

The Electric Furnace

The first electric furnace installation in the brass industry was made in 1916 and the results with this first furnace were so satisfactory that this new type is rapidly superseding the older crucible. The advantages of the electric furnace are many, and it enables the manufacturers of brass to

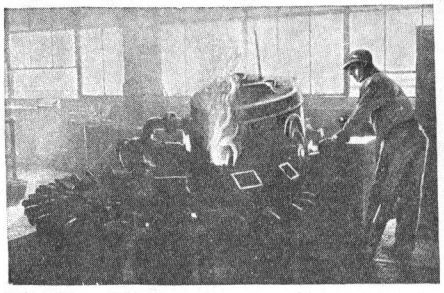


Photo Chase Co's. Inc.

A Modern Electric Furnace

apply scientific principles which naturally result in the production of brass which is uniform in quality. Due to the accurate control of the heating, the completeness of the protection from the atmosphere, and the entire absence of furnace gases, the composition of the metal is maintained to a remarkable degree of accuracy.

In the manufacture of Meccano parts brass in the form of rods and strips is used. Our next article in this series will deal with the processes through which the brass is subjected from the time it leaves the furnace to the finished rod, ready to be put in the automatic machines that turn it into the wheels and gears with which Meccano boys are so familiar.

"At the Sesqui"

(*Continued from page* 86)

Camera. The representative at this booth insisted that I witness a demonstration in the projection room, where we had a private "movie show" of some pictures which were taken with the new camera and thrown on the screen with the projection machine. I was very agreeably surprised at the clearness and lack of flicker in the projection of these films. I have been a camera enthusiast for several years, but this demonstration made me dissatisfied with "still" pictures and I will not be content now until I own a movie camera and projecting machine.

There was an interesting model of a linoleum press on exhibition. I learned that the strips of linoleum are run through rolls in these presses and as the strips pass through several presses in succession, the pressure gradually increases until the linoleum has been subjected to a pressure of 2 to 2½ tons.

In another booth was a display of numerous pieces of radio apparatus, from a simple little crystal set to the newest super-hetrodyne. In this display was included the apparatus which had ben used by Marconi to receive the first signals from across the ocean twenty-five years ago.

A Model Railroad

The exhibit that attracted most of the boys, and their fathers, too, was that of one of the famous railroads of the East. This exhibit covered 5,000 feet of floor space. The main feature is a painting, on a canvas 20 feet high and 100 feet wide, which presents in exact dimensions a side view of a steel passenger coach. Another painting, in a frame 100 feet by 30 feet, gives a perspective view of a typical section of a standard four-track main line, with freight and passenger trains shown moving in both directions. The landscape is devoted to seashore, country, mountain, city and industrial scenes.

Immediately in front of these paintings is a miniature reproduction of a four-track roadbed. The tiny railroad is 69 feet long, and on its tracks four trains are operated continuously. The locomotives and cars of one passenger train and one freight train are reproductions in miniature of present railroad equipment, and the two others are made of model engines and cars of the type in use more than 50 years ago. This contrast helps the spectator to visualize the development of railroad equipment during the past half century.

The effect is further heightened by running the model trains at different rates of speed in proper ratio to the actual speed of the full size trains. The modern passenger train traverses the 69 feet of track in 23 seconds and the passenger train of 50 years ago completes the same journey in 40 seconds. The modern freight train passes over the model road in 35 seconds but the early freight train requires 69 seconds to travel the same distance.

The entire unit of the exhibit is one-thirty-second of actual size and the roadbed, cross-ties, rails, rolling stock, automatic signals and bridges are reproduced with the utmost accuracy in the details of design, size and operation. All equipment and models used in connection with the miniature railroad were made by selected mechanics in the company's shops.

A large Eastwood weaving loom was in operation in another booth. When I visited the booth a silk pillow top was being woven. The design was the "Tower of Light"—a feature of the Sesqui to be mentioned later. The operator showed me how the loom operated, and how the different holes punched out of the moving cardboard pattern affected the "lift pins" and thereby changed the design. He was interested to learn of the Meccano loom, the construction and operation of which I described to him briefly.

The Post Office Exhibit

I left the building at the far end and entered the model Post Office adjoining. In this building were many interesting exhibits. A gallery ran around two sides of the building, from which gallery visitors could view the operations below, and watch the endless belt conveyors which carry the different bundles of mail to the sorting tables. Show cases contained articles which had been used in mail order frauds, weapons and instruments captured from mail bandits, etc. Other cases had in them some of the thousands of articles which are "lost in the mail" because of poor wrapping. These "lost" articles included everything from the finest cameras, calculating machines, opera glasses, clothing, etc., to babies' rattles.

A mail plane which had flown over 100,000 miles in the mail service was also on exhibit, as well as a Yukon Mail dog sled. A display of U. S. postage stamps, past and present issues interested me especially as I am an amateur philatelist.

The Palace of Transportation

I had heard of the fine exhibits in the U. S. Government Palace of Transportation and Machinery and made that building my next objective. My map showed me that this building was quite a distance away and I set out for it with a will. The course took me past the entire length of the huge concrete Sesqui Stadium—probably the largest of its kind in the world. It took me at least 10 minutes to walk past this great structure where, only a few nights before the cheers of 135,000 people had shaken the air when Gene Tunney won the heavyweight boxing championship from Jack Dempsey.

Finally I reached the big Government Building, and what I saw there amply repaid me for the long walk. The Curtiss Aeroplane and Motor Co. had models of all sorts, sizes and kinds of airplanes. At the Huff Daland Airplane Co. exhibit was a model of a Dusting Plane which is used on farms to sprinkle crops to keep down the ravages of insect pests.

Several huge diesel engines were on display and attracted much attention, probably due to their massive appearance. I was interested in these as I have heard of the rapid strides that these oil-burning engines have been making in recent years. Their appearance of tremendous weight seem to the average person to belie the fact that they are capable of developing considerable power by rapid combustion of crude oil in their cylinders, yet it is true that they have reached a point of development where they are as efficient as steam engines and in a number of cases, more economical.

(*Continued on page* 93)

A Page of Simple Meccano Models

"The Cum-Bak"

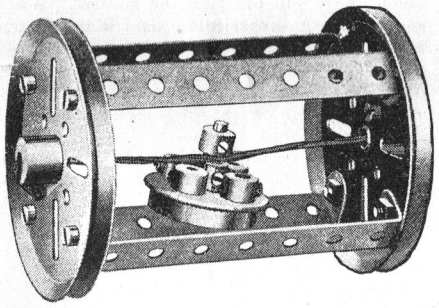
A Meccano Boomerang

We have all heard of the Australian boomerang—a peculiarly fashioned instrument that, when thrown in a particular manner, will return to its starting place. A novel Meccano boomerang, called the "Cum-Bak" is shown here and is the invention of C. W. Beese, of Hamilton, Canada.

The "Cum-Bak" is not thrown like a boomerang—it is merely rolled along a table or smooth surface. After it has traveled a certain distance it comes to a dead stop and—wonder of wonders—without apparent cause it starts up again, *this time in the opposite direction*, and returns to its starting point.

How It Works

It will be seen that the mysterious antics of the "Cum Bak" depend entirely upon a short length of rubber band and a suspended weight. The rubber band is doubled and secured between the 3" Pulley Wheels, from center to center, and the weight, consisting of any suitable Meccano parts, is attached to it in the middle of the drum.



The weight illustrated comprises a Flanged Wheel carrying four Collars, the set-screws of which grip the shank of bolts passed through the Flanged Wheel.

As the drum rolls along, the weight tends to remain in its original position and the rubber band becomes twisted. The resistance in the rubber retards the drum to an increasing extent and finally stops it. The effort of the rubber band to return to its former state then causes the drum to roll in the opposite direction. By the time the rubber band has regained its normal position the drum has gathered a certain momentum, which usually carries it a little way past its starting point. It soon returns, however, and after a few short oscillations, it finally come to rest practically at the spot from which it started its rolling movement.

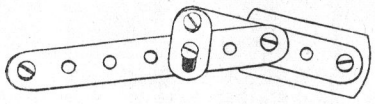
In order to make the action of the model appear more mysterious, the drum should be covered by thin cardboard or paper to conceal the inner details. It is interesting to hear the comments of uninitiated persons regarding the reason for the "Cum-Bak's" unusual antics and we assure our readers that the enjoyment they will get from this unusual little device will well repay them for the time taken in its construction.

Using Old Razor Blades in Meccano Models

No doubt many of our readers have a supply of razor blades which have been discarded by their fathers and older brothers. These blades although no longer suitable for use in shaving, still have edges keen enough for ordinary cutting and make good knives for trimming photographs, sheets of paper, cardboard, etc. Two models in which these blades are used are illustrated and described below and can be readily made up without difficulty.

A Razor Blade Knife

A very satisfactory knife, making use of a razor blade, is illustrated below and the construction of this instrument is so simple that no detailed instructions are necessary. Two of each part illustrated are used, one being placed on either side of the blade in

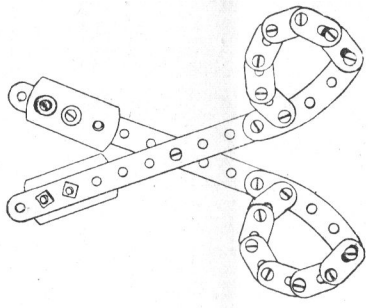


order to make the knife rigid. To build this model two of each of the following parts are required: Nos. 3, 5 and 10; 5 of No. 37 and 1 razor blade.

By substituting 2½" flat girders, No. 103f, for the 2½" strips, the upper edge of the blade can be concealed, and thus be protected from damage and the operator's fingers will not be endangered by it. When the lower cutting edge of the blade has become very dull, all that is necessary is to reverse the blade, bringing the unused edge in cutting position.

A Razor Blade Scissors

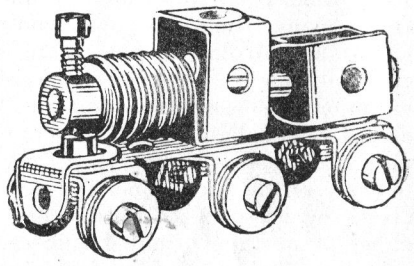
Somewhat similar to the knife shown above is the scissors illustrated here. The blades are bolted directly to the No. 2 Strips and the heads of the bolts are prevented from pulling through the holes in the blades by means of Washers. Two nuts



screwed to the bolts are used as a pivot and these are lock-nutted together by tightening one against the other, which prevents them from becoming loose. Enough play is allowed in the bolt to permit of easy movement of the strips. The following parts are required to build the scissors: 2 of No. 2, 2 of No. 90, 12 of No. 10, 4 of No. 38, 20 of No. 37, and 2 razor blades.

Is This the World's Smallest Locomotive?

We have from time to time illustrated and described special large models which can be built with Meccano and in which many intricate movements are reproduced. There have been large steam locomotives in which many of the details of cylinder operation, valve mechanisms, etc., have been shown and these models have received many favorable comments. However, there is one drawback to them, from the viewpoint of the Meccano boy. They usually require more



parts than the average model-builder has at his disposal.

It does not always require a large number of parts, however, to build a locomotive. Take, for instance, the model illustrated above. This is probably one of the smallest that could possibly be built with standard parts and we leave it to the judgment of our readers to say whether or not it requires too much material to make it. The illustration is full size and shows clearly the construction of this little model.

Building the Model

The boiler consists of a worm wheel, No. 32, to which is secured a 1½" axle rod. The engineer's cab is made up of two double brackets and the tender consists of the same parts, but placed horizontally, instead of vertically, as are those forming the cab. The frame of the locomotive is a 2½" perforated strip and the wheels are bolted to 3 double brackets which in turn are secured to the strip. An angle bracket is used as a "cow-catcher" and completes the model.

The following parts are required to build the locomotive: 1 of No. 32, 3 of No. 21, 7 of No. 11, 1 of No. 5, 11 of No. 37, 6 of No. 23a and 1 of No. 18a.

This little locomotive will no doubt interest our readers and we suggest that they attempt to construct similar miniature models of other subjects. We shall be glad to receive particulars of any such that our readers may build.

More Small Models Coming

A number of new models which boys with the smaller Meccano outfits can make are in course of preparation and will be published in forthcoming issues. One of these, for instance, is a loom that will actually weave—and it is made with a No. 0 Outfit! Watch for it.

Our Contest Page

Awards in the 1926 Model-Building Contest

We were pleasantly surprised at the large number of entries in this contest. A high standard of excellence was displayed in the models submitted and this helped to make the judging of the models and the distribution of prizes a difficult and lengthy task, although an enjoyable one.

As was anticipated, many of the models submitted were of subjects which had been duplicated in model form many times in past contests. Cranes and airplanes by the score were received, but as nearly every possible variation in construction of these models has been submitted in contests of the past, these models had very little chance to carry off the high honors. The models for which prizes were awarded are either of new and original subjects or subjects which have already been reproduced in model form, but which, in the estimation of the judges, show unusual ingenuity on the part of the builder.

Winner of the First Prize

Paul H. White, Tarentum, Pa.

In addition to the three prizes offered in this contest, the judges have decided to award 12 further prizes for models that show merit. The complete list of prize winners is given below:

The Prize Winners

First Prize.....Meccano goods, value $25.00
Paul H. White, Tarentum, Pa.....Open Hearth Charging Machine

Second Prize.....Meccano goods, value $15.00
Donald M. Wood, Jr., Chicago, Ill.....Automatic Electric Elevator

Third Prize.....Meccano goods, value $10.00
Raymond R. Gould, Detroit, Mich.....Motor Dump Truck

Three Prizes of S 2 Clockwork Motors
Harold Baer, W. Reading, Pa.....Wrecking Crane
Richard Clayton, Bound Brook, N. J.....Electric Tree Feller
Malcolm B. Robinson, Norwood, N. J.....Radio Panel Engraving Machine

Four Prizes of Electrical Outfits
Claude E. Carpenter, Prairie Home, Mo.....Steam Tractor
Colvin L. Gibson, Detroit, Mich.....Locomotive
Irving Hankins, Chicago, Ill.....Sand Toy
John Rea, Brooklyn, N. Y.....Winch

Five Prizes of "Standard Mechanisms Manuals"
Ralph B. Thompson, Hartford, Conn.....Motor Bus
Cuthbert R. Rowe, E. Hampton, N. Y.....Measuring Machine
Robert Woodrum, Norristown, Pa. .....Dump Truck
Edison Price, White Plains, N. Y.....Crane
Franz Bidinger, Kenosha, Wisc. .....Mine Operator

You Can Get New Meccano Parts Free

In the October issue we announced a new contest—one in which every contestant gets a prize. As many boys are being added to our list of readers with this issue, we are repeating the few simple rules of this contest to enable them to enter it and earn new parts for their efforts.

Our regular readers are merely to show their copies of the "M.M" to their friends who do not receive it regularly and to take subscriptions for it. For each subscription for one year (six issues) at 25 cents sent us, we will credit to the account of the sender the amount of five cents to apply on the purchase of any Meccano parts after the close of the contest. In addition to these awards, there will be a Grand Prize as follows: We will *double* the amount of credit earned by the contestant who sends in the greatest number of new subscriptions during the contest.

Now go to it, boys! Here's a good chance to earn new Meccano parts. How many you earn depends entirely on how much effort you put into the contest. When you receive a subscription send it in at once with the 25 cents collected for it. Write the new subscriber's name and address *clearly* so there will be no chance for a mistake. Also write on the sheet: "This subscription sent in by——," adding your name and address, so that the subscription can be properly entered to your credit. Send all subscriptions to: Reader's Contest, Meccano Magazine, Elizabeth, N. J.

This contest closes on January 15th, 1927, and the awards will be made as soon thereafter as possible.

Results in the Second Photographic Contest

This contest was even more successful than the First Photograph Contest. A large number of fine entries were received; these are now being given the attention of the judges. We hope to print the list of winners and the prize winning pictures in our next number.

How Many Words in M-E-C-C-A-N-O?

Of the many different forms of contests that have been held in the past, this one seems to appeal to our readers most strongly, if the volume of entries is any indication. The contest ended on December 1st and the results will be published in the February issue.

What kind of Contests do you like?

If you have any suggestions for future contests, do not hesitate to send them in. Any ideas submitted will be carefully considered. Address all suggestions to Contest Editor, Meccano Magazine, Elizabeth, N. J.

"At the Sesqui"

(*Continued from page* 90)

The exhibit of the Baldwin Locomotive works was one of unusual interest. Here was exhibited "Old Ironsides," Baldwin's first locomotive, made in the early '30's. "Big Mogul No. 600," a passenger locomotive from the Centennial Exhibition of 1876, was also on display, and although only fifty years have elapsed since this locomotive was the largest passenger locomotive of its day, it looks small and almost ridiculous in comparison with even the average passenger locomotive on present day railroads. The contrast was more evident when one viewed the great "Mountain type" locomotive at the Pennsylvania Railroad's exhibition in this building. Whereas the "Big Mogul" weighs 75 tons and is 57 feet long, the "Mountain" locomotive weighs 300 tons and is 88 feet long. This engine is certainly a beautiful piece of machinery and I stood before it for many minutes, impressed with the atmosphere of power and stamina that it seemed to bear.

An Electric Giant

In contrast to the mammoth steam locomotive mentioned above, the Chicago, Milwaukee and St. Paul Railroad had on exhibition one of the most powerful electric locomotives in the world. This giant weighs 283 tons and has a horse-power rating of 4,200. It was built by the General Electric Co. and is one of several used by the C., M. & St. P. Railroad to haul their famous train, the "Olympian," over the Rocky Mountains.

"Langley's Folly"

The famous Langley airship was also on exhibit. This old plane was the invention of Prof. Langley and was known as "Langley's Folly," as no one believed that it could possibly lift itself from the ground and fly. Langley died before he was able to prove that it could actually fly, and it was not until a few years ago that, by substituting a more powerful engine for the crude one with which it was equipped, and making a few slight alterations in its construction, it actually made a sustained flight and vindicated Prof. Langley's faith in it.

As I left the building I was surprised to find that the sun was setting. I had spent the whole day in only three of the buildings! In fact, I had been compelled to inspect the exhibits in these buildings very hastily, and I hardly "scratched the surface" of the great exposition. But I believed that I had visited the sections that would be most interesting to "*M.M.*" readers.

The walk back to the main entrance was one of many surprises. In my haste to view the exhibits in the Government building I had not noticed especially the side of the street opposite the Stadium, and was now surprised to note the beautiful state buildings which lined the broad avenue. They were all picturesquely located in the League Island Park, where, in addition, was a replica of a street of 1776, the Palace of Education, the Palace of Fine Arts, etc., all gorgeously illuminated.

The Tower of Light

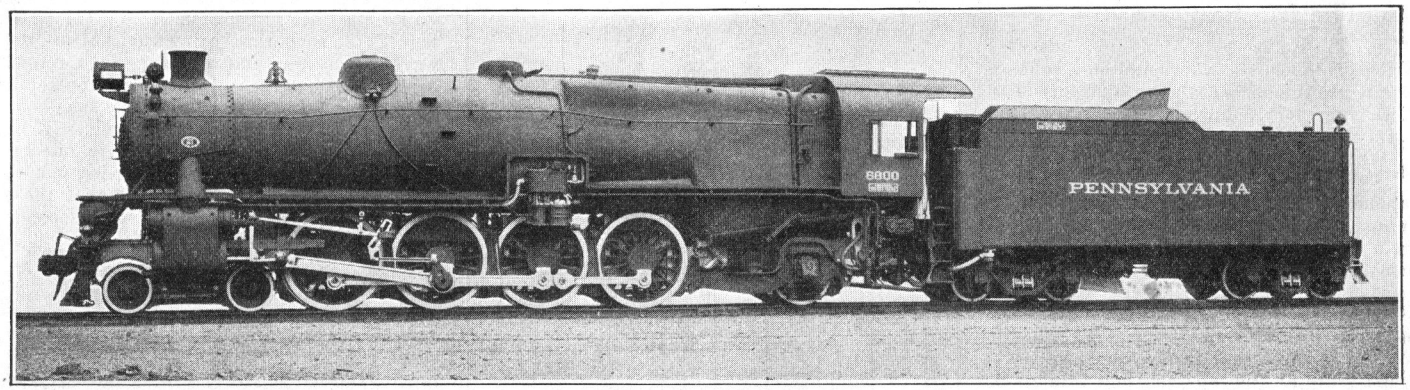
As I again approached the Model Post Office, I saw the "Tower of Light" blazing forth with myriads of electric globes. This tower is over 200 feet high and is surmounted by the "Light of Independence"—a beacon which can be seen from all parts of the city and appears as a great silver shaft shedding its radiance over the entire Exposition grounds.

Directly opposite was the entrance to "Gladway"—an amusement park ablaze with multicolored electric lights and crowded with laughing, happy people bent on enjoying themselves. All the familiar devices of Amusement Resorts were represented here—the Whip, Ferris Wheel, Merry-Go-Round, Caterpillars, etc., in addition to others that were being introduced for the first time. Here is also the greatest concentration of light ever seen in one spot in the history of the world—a battery of 14 super-power search-lights, totalling 6,300,000,000 candle power and visible on clear nights nearly 100 miles away.

A Mammoth Auditorium

I was pretty tired by this time so I did not spend much time in the Gladway, but forced my weary feet towards the Auditorium at the main entrance opposite the Palace of Liberal Arts. I was glad of the chance to sit down in this great auditorium which seats 20,000 persons and listen to a beautiful organ recital. When this was over I joined the crowds that were making for the main entrance—now transformed into an exit by the throngs who were wearily wending their way homeward. I again approached the mammoth Liberty Bell which was now illuminated. I cannot express in words what an effect this dazzling sight had on me. It seemed to brace me up and make me forget my fatigue, and in its shimmering brilliance—produced by the 25,000 electric lights of 100 watts each with which it is studded—is one of the most inspiring scenes that I have ever witnessed,

THE END.



The Mountain Type Locomotive, built in 1926. *One of the most powerful in the world.*

How Jack Discovered the Perfect Toy

(*Continued from page* 85)

advantage of being able to build the motor right into the model. Only with the patented Meccano motor can this be done; it is provided with heavy side-plates, flanged and perforated with the standard Meccano equidistant holes.

Another thing that Jack noticed was how smoothly the gears meshed. "That's because they are made out of solid brass," I told him, "and the teeth are cut on a machine that makes Meccano gears as accurate as those in a fine watch. They are all standardized and you can get any combination of speed and power that you want with them, and when you run them together you don't need to worry about whether they will mesh or not—they *will* because they are made right."

Strong, Heavy Steel

"But why is my model so weak, and yours so strong" asked Jack. "If I should try to lean on top of mine like you did on yours, it would collapse right away."

"That's because Meccano parts are made of strong, heavy steel, instead of thin flimsy stuff," I told him. "They're made to last, and believe me, they surely do "stand up." And not only that, but each part is so designed that it can be used in a number of different ways. That's why I can build so many more models than you can with your set. It isn't the *number* of parts in a model that counts, you see, but the kind of parts."

"How do you know so much about Mec-

(*Continued on page* 95)

Puzzles for You to Solve

Mystic Numbers

Puzzle No. 57—A Boy Scout was standing on the platform of a railroad station one day and he noticed that the number on a certain engine contained four figures. The first and the last figures were the same, and when multiplied together they gave the two middle figures. Also the sum of the two middle figures gave the first and last figures. What was the number on the engine?

The Mathematical Books

No. 58—Harry pointed to his bookcase which contained the nine handsome volumes of an encyclopaedia that his father had given him for a birthday present. "That is very funny," he said.

"What do you mean?" asked his sister.

"Well," replied Harry, "I put the nine volumes on the shelves anyhow this morning before I went to school, intending to put them in their proper order when I came home, and I was just going to do so when I made a curious discovery."

"I don't see anything unusual about the books," said his sister.

"Look again," said Harry. Volumes 6, 7, 2 and 9 are on the top shelf and volumes 1, 3, 4, 5 and 8 on the shelf below, and these figures, written as a fraction, 6729/13458 equals ½.

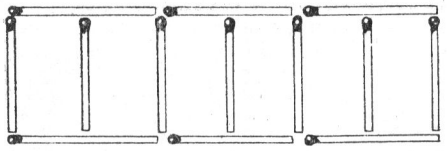
"That is so," said his sister, "but it is just chance. Can you rearrange them to equal ⅓?"

"I can easily do that," said Harry. "I can make them equal ⅓, ¼, 1/5, 1/6, 1/7, ⅛ and 1/9."

Harry thereupon did so and his sister admitted that he was right. How did he do it?

Can Twelve Equal Thirteen?

No. 59—The following diagram, made with thirteen matches, represents a farmer's hurdles arranged so as to enclose six sheep pens all of the same size. One of these hurdles was stolen and the farmer was



unable to replace it. After a great deal of thought he found that, by re-arranging the remaining twelve hurdles, he could still enclose six pens of equal size. How did he do it?

What Am I?

No. 60—

My mouth is bigger than my head,
And I am always in my bed.
Now that is where the mystery lies,
For I've been often known to rise,
Although in bed I am not still,
But always moving down the hill,
And though I never leave my place,
I sometimes take part in a race,
Though this may seem plain contradiction,
Yet I assert it is not fiction.

A Fish Story

No. 61—Dick (to Tom coming home from fishing): "Did you catch anything, Tom?"

Tom: "Yes, a big one."

Dick: "How big was it?"

Tom: "Its head was 9 inches long."

Dick: "How long was its tail?"

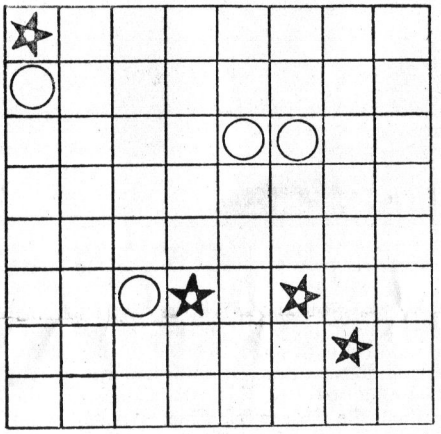
Tom: "As long as its head and half as long as its back."

Dick: "And how long was its back?"

Tom: "As long as its head and tail put together."

How long was Tom's fish?

No. 62—How may the diagram below be divided into four equal parts each of the same shape and each containing one star



and one circle? The division must be made along the horizontal and vertical lines in the figure.

Answers to Puzzles in the Last Issue

No. 51—The six moves are as follows: 12 to 3; 7 to 4; 10 to 6; 8 to 1; 9 to 5; 11 to 2.

No. 52—The word is Flower.

No. 53—Roland, Arnold, Ronald.

No. 54—Around me shall hover,
In sadness or glee,
Till life's dreams be over,
Sweet mem'ries of thee.

No. 55—The milkman took three gallons out of the eight gallon can and poured them into the five gallon measure. Next he took another three gallons from the large can and with this proceeded to fill up the five gallon measure. This left five gallons in the five gallon measure, one in the three gallon measure and two in the eight gallon can. Next the milkman poured the five gallons into the eight gallon can and the one gallon into the five gallon measure. This left one gallon in the five gallon measure, seven in the eight gallon can and none in the three gallon measure. Then he took three gallons from the seven in the large can, poured them into the five gallon measure, and thus made up his four gallons exactly.

No. 56—Old port from Oporto good for orthodox Oxford dons.

The World Behind Your Telephone

(*Continued from page* 84)

sound known as the dial tone. This indicates that the apparatus is ready to receive a call. Upon hearing this tone we place our finger in the finger-hole containing the letter E and pull the dial in a clockwise direction until the finger is stopped by the curved arm shown just above the 0 hole in figure 2. We then remove the finger and the dial automatically returns to its proper position. When it has stopped moving we then place the finger in the hole containing the letter M and again pull the dial to the stop allowing it to again return to normal. Following this we continue to dial the numbers 2272, each time bring the dial all the way to the stop and allowing it to return before proceeding with the next numeral. As soon as this has been done the telephone called is automatically rung, unless it is busy. This ringing is indicated in our receiver by an intermittent burr-rr-ing sound, which is the ringing signal. One of these two signals is heard within a few seconds after the dialing is completed.

Special Code Signals

In addition to regular call signals as described above a number of codes involving only three numbers can be made. For example, by dialing the numerals 411 the subscriber is connected direct to the long distance operator: by dialing the tenth finger hole once the subscriber will be connected with a regular telephone operator who helps him to get the subscriber he desires if he has had trouble in dialing correctly.

The automatic equipment used is known as the panel type, and derives its name from the frames or panels on which the major part of the selecting mechanism is mounted. This selecting equipment, however, is under the control of a collection of relays and switches known as the "sender" which may well be called the "brains of the mechanism." When we dialed the letters and numbers of the telephone which we called, certain electrical impulses were sent out. These were received and registered by the "sender."

The Marvelous Selectors

As soon as the impulses indicated the letters "E M" were received, selecting mechanisms known as "district" and "office" selectors were set in operation and selected an idle trunk line leading to the Emerson central office. The trunk line selected terminates in the Emerson office at an "incoming" selector which has access to "final" selector frames on which all Emerson subscribers' lines are terminated. These selector frames are marvelous pieces of mechanism and their construction and operation are far too complicated to be dealt with in this article. The impulses registered by the sender when we dialed the numbers 2272 cause the selectors to operate in such a manner as to make the proper connection with the desired terminal, completing the circuit between our telephone and the one called. As soon as the connection has been made the sender at our central office is no longer required and is at once released ready to receive a call from another subscriber connected to the same exchange.

Meccano Magazine

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CHANGE OF ADDRESS—Subscribers should notify the Editor at once of any change of address. Send a postcard,—*giving both old and new addresses*,—so that our records can be kept up-to-date.

Meccano Parts in Colors

The New Multicolor Meccano outfits have received a very enthusiastic welcome by boys all over the country and many of them have written in asking for particulars of the Meccano parts which are now colored. We give below a list of the regular Meccano parts which are available in the new colors.

PARTS IN RED

No.	Description	Price
41	Propeller Blades .....per pair	$ .15
52	Perforated Flanged Plates 5½" x 2½" .....each	.25
52A	Flat Plates 5½" x 3½".....each	.15
53	Perforated Flanged Plates 3½" x 2½" .....each	.20
53A	Flat Plates 4½" x 2½".....each	.12
54	Perforated Sector Plates.....each	.20
61	Windmill Sails .....each	.10
70	Flat Plates 5½" x 2½".....each	.15
72	Flat Plates 2½" x 2½".....each	.10
76	Triangular Plates 2½".....each	.05
77	Triangular Plates 1".....each	.04
108	Architraves .....each	.09
109	Face Plates 2½".....each	.20
118	Hub Discs 5½".....each	.50
119	Channel Segments .....each	.15
126	Trunnions .....each	.10
126A	Flat Trunnions .....each	.06
131	Dredger Buckets .....each	.15
133	Corner Brackets .....each	.10
139	Flanged Brackets (right)....each	.10
139A	Flanged Brackets (left).....each	.10
143	Circular Girders 5½".....each	.55
145	Circular Strip 7".....each	.50
146	Circular Plates 6".....each	.60

PARTS IN GREEN

90A	Curved Strips 2½" (small radius) .....half doz.	25
97	Braced Girders 3½".....half doz.	.20
98	Braced Girders 2½".....half doz.	.15
99	Braced Girders 12½"....half doz.	.75
99A	Braced Girders 9½".....half doz.	.60
100	Braced Girders 5½".....half doz.	.50

There is no difference in the prices of colored or nickeled parts but when colored ones are required the letter "X" should be added to the catalog number shown in this list, thus "99X." If nickeled parts are required the regular catalog number only is to be used, as heretofore. In cases where parts already have a letter, such as "No. 99A" nickeled parts still go under this number and colored parts will be designated by adding "X" after the letter, as "No. 99AX."

How Jack Discovered the Perfect Toy

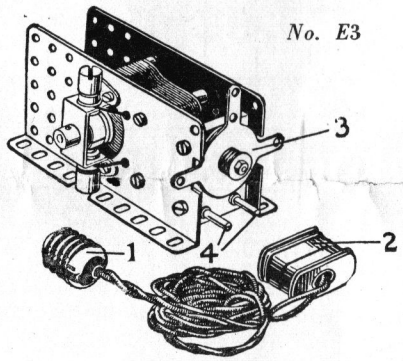
(*Continued from page 93*)

cano?" asked Jack. "You must have been playing with it for a long time."

"Yes, I have," I answered, "in fact, I've been a Meccano fan ever since I was 6 years old, and I guess I've built many hundreds of models since I started. I've been adding separate parts from time to time so I could build bigger models. You see, I want to be a construction engineer when I grow up and my teacher at school told me that this experience I'm getting now with Meccano will help me a lot when I study engineering. Dad and I visited the Meccano factory at Elizabeth a short time ago and we saw how all the parts are made. You'd be surprised to see the wonderful machines they have there for making the parts. And every single part is carefully inspected before being packed, and if one does not come right up to standard it is thrown out. It's a great place, and some day you ought to go over there and go through it."

"The best way to keep up to date in Meccano is to get the Maccano boys' paper regularly—the "Meccano Magazine." Here's a copy of the last issue—it's just full of interesting news—stories, articles on engines, airplanes, etc., new Meccano models, prize contests, puzzles and lots of other things. I've subscribed to it since it first came out and I would not be without it. It costs only 5 cents a copy and it's worth a whole lot more."

The New 110 Volt Meccano Electric Motor



This motor is designed to operate on 100-120 volts, either direct or alternating current, without the need of a transformer or reducer.

The plug 1 is screwed into any available lamp socket and the terminal block 2 is pushed as far as it will go over the connection pins 4. By turning on the key in the socket the motor is ready to operate. It has a reversing switch 3 to control the direction of rotation. Price $9.50.

Jack Learns about the "M.M."

Jack took the "M.M" and became so interested in it that he would not rest until I told him where he could get a copy.

Again we turned to the model, its multi-

(*Concluded on next page*)

Our Mail Bag

In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives a great many letters each day, and correspondents will help him if they will write neatly and on one side of the paper only.

Frank Willey, Cincinnati, Ohio—Congratulations, Frank. You are to be complimented on the fine Meccano Crane you built, and which won the prize at the Boy's Hobby Fair held by the Rotary Club. Your suggestion for new parts will be carefully considered.

George Hazzard, E. Rochester, N. Y.—That is a splendid idea of yours, George, to celebrate your birthday by building an original Meccano model. I can easily believe that you had "quite a job" figuring out the mechanism for it. About that 4A outfit, just keep after Dad, probably he will see that you get it for Christmas.

Robert Gordon, E. Cleveland, Ohio—Indeed, I do not consider you "a terrible specimen of a Meccano Boy" for not answering my letter sooner, Robert. I shall be glad to get that story of your trip through the electric power plant. Probably I might find room for it in a future "M.M."

Charles Harrison, Askam, Penna.—Your letter came just as we had decided to increase the size of the "M.M.", Charles, as you suggested. Do you like it better now?

Carlyle Dryden, Council Bluffs, Iowa—Writes that he "subscribed to the "M.M." several [illegible]. It was then only a dinky four-page affair, published quarterly." Recently he received a sample copy of a 1926 issue. He says of it: "I read it over and wish to congratulate you on the remarkable improvement that it has made since that time. I feel that I cannot be without it." He backs up his last statement by sending in a year's subscription.

Richard Betts, Jamestown, N. Y.—An oil drain for autos! What next? We think such a new Meccano part would not prove very useful, Robert. Every part included in the Meccano system must be suitable for use in a number of ways rather than for one particular purpose, so that the system will not become cluttered up with a large number of special parts.

Blain Griffith, Laurel, Nebr.—Too bad your friend hasn't a Meccano set, Blaine, then he could have as much fun as you do with yours. Probably Santa will be better to him this Christmas and give him one.

Robert Hanson, Green River, Wyo.—Has a printing set and prints names of Meccano parts on little boxes in which he keeps his "stock." A good idea, Robert. In this issue you will find several small models which do not require very many parts to build.

Albert G. Ross, San Jose, Calif.—Well, here is the "M.M." Albert, and you will no doubt be glad that "there is more of it," as you wished. Your suggestions for new parts will be dealt with carefully.

Henry Gerrish, Hillsboro, Ore.—Is an old friend of Meccano. He played with it years ago when he was a youngster; now he has a 4-year old boy of his own and writes that his son Charles "is going to inherit all my Meccano for Christmas." Charles is in for a happy time!

How Jack Discovered the Perfect Toy

(*Concluded from preceding page*)

color parts glistening in the bright sunlight. "It looks so much more attractive than my model—what a wonderful improvement the colors make and how beautifully the parts are finished! I wonder how they get the paint on so smoothly?"

"Well, to begin with, it isn't paint at all," I explained. "It's Duco—the same Duco that they use on the best auto bodies. It's a lacquer and it is sprayed on—I saw them do it at the factory when I was there. They use a "spray gun" that looks like an automatic pistol. This shoots an even coat of the lacquer on the parts. It dries quickly and makes a hard, tile-like finish—and Duco-finished parts cannot rust.

The Final Touch

"Mr. Hornby—he's the inventor of Meccano, you know—Mr. Hornby told me, when I was at the factory, that ever since he had created the construction toy business over twenty years ago, he had been constantly improving the engineering qualities of Meccano, until now he has it as nearly perfect an engineering toy as anyone could imagine. Then, after he was convinced that the *design* of the parts couldn't be improved, he tried to improve their *appearance*,—and the New Multicolor Meccano is the result.

"You can see for yourself how he has changed the whole appearance of the models —how, in fact, he has made a back number of the old style dull, colorless models of cold steel, by adding the magic of warm, vivid colors. 'No more colorless models for me,' say I, and I'll bet every boy who sees the New Multicolor Meccano outfits will say the same thing. Don't you?"

"I'll say I do," exclaimed Jack, "I don't see how anyone could be satisfied with any other kind. Well, my birthday is next week, and I'm going to tell Dad that I want a New Multicolor Meccano outfit."

Jack Gets a Surprise

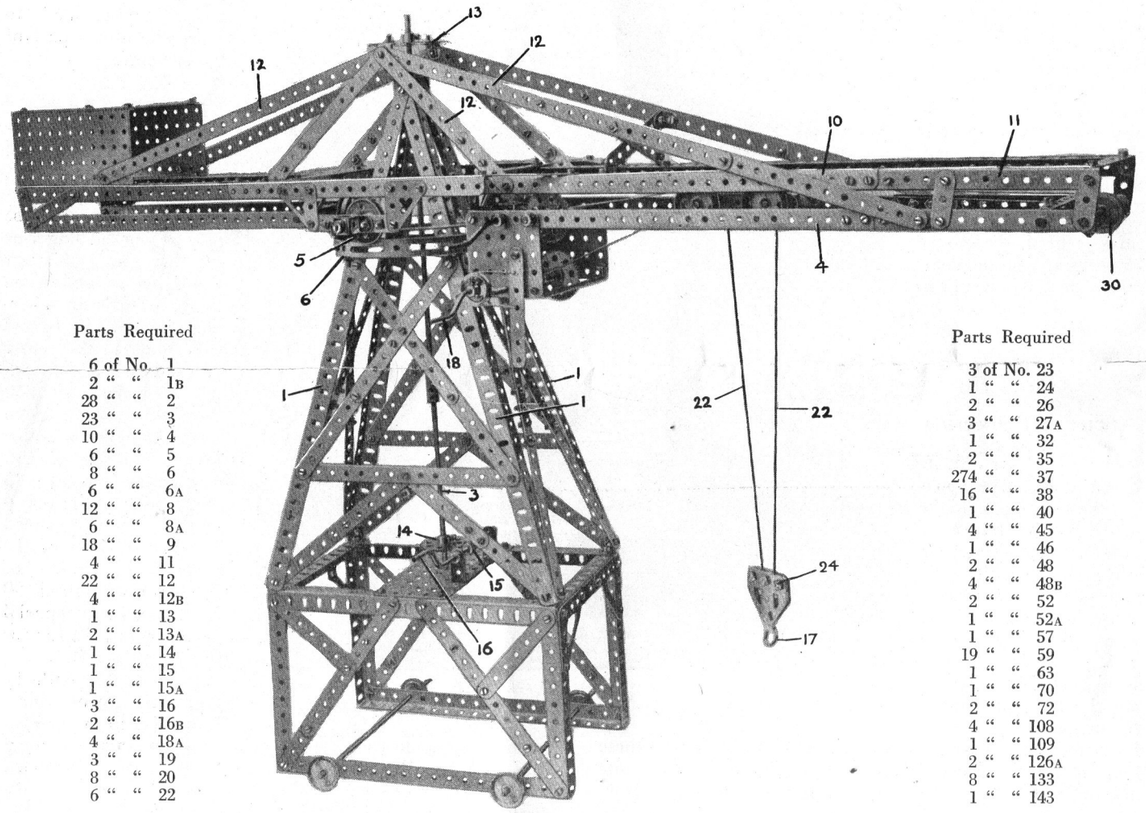
About ten days afterwards, Jack came running across the street shouting: "Oh, Dick, I've got it, I've got it." For the moment I couldn't imagine what he was talking about, and asked him what he meant. "Why, the New Multicolor Meccano, of course. I've been after Dad since I saw your model, and to-day is my birthday and he gave me a dandy No. 3X outfit. Gee, I'm glad you set me right, Dick, and showed me how fine Meccano is. Now for some fun with real models."

I could not help feeling a little flush of pride and satisfaction in the knowledge that I had been able to help Jack find real pleasure and joy with Meccano, instead of the disappointments he had before. How I wish I could tell all the boys in this great country about the loads of fun that are packed in every box of Meccano, and that Meccano is the only passport necessary for admission to that glorious place called Meccanoland—where joy and good fellowship reign and where happiness is supreme.

This issue of the "M.M" will no doubt reach far more boys than I shall ever be able to speak to, and so I have asked the Editor to print this little story in the hope that it will help other boys find real happiness in The New Multicolor Meccano.

How to Build a Meccano Model Radial Travelling Crane

BEGIN to build this model by constructing the main tower, the details of which are clearly brought out in the illustration below and also in Fig. A on the next page. Notice that the inclined corner angle girders 1 are connected at the top (as shown in Fig. A) by a bush wheel 2 secured by angle brackets. This bush wheel forms a bearing of the vertical rod 3 by which the cantilever arm 4 is turned.



Parts Required

6	of No.	1
2	" "	1B
28	" "	2
23	" "	3
10	" "	4
6	" "	5
8	" "	6
6	" "	6A
12	" "	8
6	" "	8A
18	" "	9
4	" "	11
22	" "	12
4	" "	12B
1	" "	13
2	" "	13A
1	" "	14
1	" "	15
1	" "	15A
3	" "	16
2	" "	16B
4	" "	18A
3	" "	19
8	" "	20
6	" "	22

The Cantilever Arm

The cantilever arm turns on a wheel-race formed of flanged wheels 5, which run on a circular girder 6 supported by four 1" x ½" angle brackets bolted to the corner girders 1. The cantilever is built up (as shown in Fig. B) from two 9½" angle girders 8 braced by two 5½" angle girders 9 overlapped nine holes. From these, 12½" angle girders 10 extend at one side, and to similar girders 10 at the other side are connected 5½" girders 11.

The inclined strips 12 are connected at the top, by means of angle brackets, to a face plate 13 secured to the vertical rod 3. At the foot of the rod 3 is a 1½" gear wheel 14 engaged by a worm wheel 15 operated by the crank handle 16 and in this way the cantilever arm is swung round, the wheels 5 riding on the circular girder 6.

Parts Required

3	of No.	23
1	" "	24
2	" "	26
3	" "	27A
1	" "	32
2	" "	35
274	" "	37
16	" "	38
1	" "	40
4	" "	45
1	" "	46
2	" "	48
4	" "	48B
2	" "	52
1	" "	52A
1	" "	57
19	" "	59
1	" "	63
1	" "	70
2	" "	72
4	" "	108
1	" "	109
2	" "	126A
8	" "	133
1	" "	143

Raising the Load

The load carried from the hook 17 is raised or lowered by the crank handle 18, a ½" pinion 19 on which engages a 1½" gear wheel 20 on a rod 21 on which is wound a cord 22. This cord passes over a ½" pulley 23 to the block 24 and back over another ½" pulley on the trolley, and is secured to the 3½" x ½" double angle strip 25 at the outer end of the cantilever arm. Consequently when the trolley is caused to travel along the cantilever arm the load remains suspended at a constant height—an important point and an interesting detail.

How to Connect the Trolley

The trolley is caused to move to and fro along the cantilever arm by the action of the crank handle 26. On this a ½" pinion 27 engages a 1½" gear wheel 28 on a rod on which is wound the cord 29, the opposite ends of which are connected to the opposite ends of the trolley. The cord 29 passes round a pulley 30 at the outer end of the jib. By turning the crank handle 26, therefore, the cord 29, winds on and off its rod, and moves the trolley to and fro, its wheels 31, as shown in Fig. C, running on the angle girders 10.

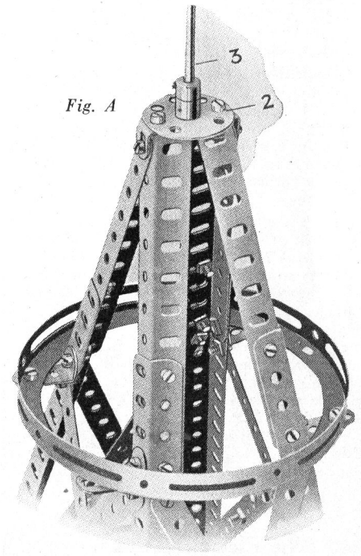


Fig. A

The Turn-Table Wheels

The wheels 5 are connected to 1½" rods 5a which are journalled in double bent strips 5b bolted to 3½" strips 5c carried from the angle girders 8 by corner brackets 5d.

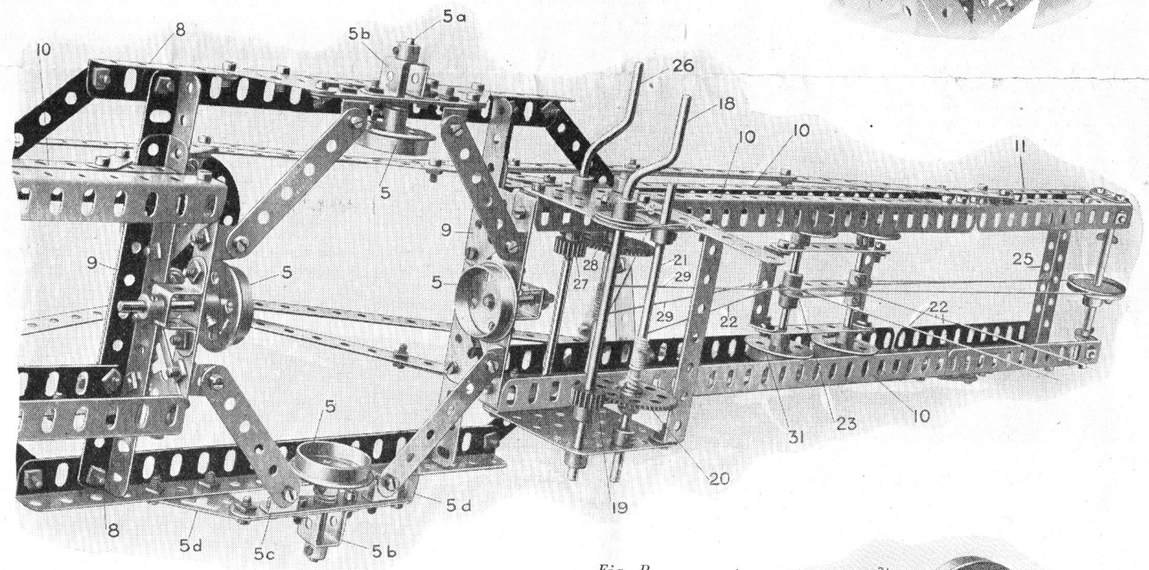


Fig. B

Radial cranes are used extensively in iron and steel yards and in lumber yards, where it is necessary to drop loads over a large area. The ground covered by the rotating cantilever arm is very considerable, and in some cases the arm is of great length. If it is desired to drop the load close in to the crane it is only necessary to run the travelling trolley (or truck) inwards along the arm. This enables the load to be dropped at any point between the base of the crane and the end of the arm.

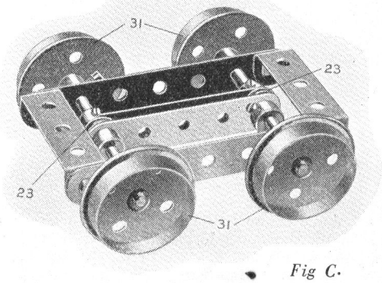


Fig C.